



УДК 595.764 (519.3+510+682)

**THREE NEW SPECIES OF THE SCARAB BEETLE GENUS *MADECORPHNUS*
PAULIAN, 1992 (COLEOPTERA: SCARABAEIDAE: ORPHNINAE)
FROM MADAGASCAR**

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ABSTRACT

Three new species of the scarab beetle genus *Madecorphnus*, endemic to Madagascar, are described and their characters are illustrated: *M. hanskii* sp. nov. (Ambohitantely Special Reserve, Central Plateau), *M. aquilonius* sp. nov. (Northern Madagascar), and *M. barclayi* sp. nov. (Masoala Peninsula, North-Eastern Madagascar). Distribution maps are presented.

Key words: Madagascar, orphnines, scarab beetles

**ТРИ НОВЫХ ВИДА ПЛАСТИНЧАТОУСЫХ ЖУКОВ РОДА *MADECORPHNUS*
PAULIAN, 1992 (COLEOPTERA: SCARABAEIDAE: ORPHNINAE) ИЗ МАДАГАСКАРА**

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РЕЗЮМЕ

В статье описаны и проиллюстрированы три новых вида пластинчатоусых жуков эндемичного для Мадагаскара рода *Madecorphnus*: *M. hanskii* sp. nov. (заповедник Амбохитантели, центральное плато), *M. aquilonius* sp. nov. (Северный Мадагаскар), и *M. barclayi* sp. nov. (полуостров Масоала, Северо-Восточный Мадагаскар). Представлены карты распространения видов.

Ключевые слова: Мадагаскар, орфнины, пластинчатоусые жуки

INTRODUCTION

Madecorphnus Paulian, 1992 is a peculiar genus of the Madagascan scarab beetles. Members of this genus are characterized by strongly asymmetrical mandibles in some males (Paulian 1992) as well as by the chaetotaxy of the head and pronotum which is not found in other scarab beetles (Frolov 2010a).

After the revision of the genus was published (Frolov 2010a) I was given an opportunity to examine additional material which was not available previously. In this material, I found specimens belonging to 3 distinct species which cannot be referred to any of the described ones. In the present paper these new species are described and their characters are illustrated. Distribution maps are also presented for each species.

MATERIAL AND METHODS

Preparation of genitalia follows the common technique used in entomological research. Photographs of the habitus and parameres were taken with a Leica MZ9.5 stereo microscope from dry specimens. Partially focused serial images were combined in Helicon Focus software to produce completely focused images. Photographs of the internal sac armatures were taken with the same microscope from specimens in glycerol. Photographs were not altered except for digital enhancing with Adobe Photoshop (levels and tone correction, background elimination, sharpening). To analyze the distribution of the species, maps were generated with ArcGIS software. As the base map, a Madagascar vegetation map (CEPF Madagascar Vegetation Mapping Project of Royal Botanic Gardens, Kew, Missouri Botanical Garden, and Conservation International's Center for Applied Biodiversity Science; <http://www.vegmad.org>) was used. The vegetation map provides a good general representation of the main biomes of Madagascar. Co-ordinates of the localities were taken from the specimen labels, if available, or traced using literature (Thorstrom and Watson 1997).

Institutional abbreviations. BMNH, Natural History Museum, London, UK; CASSF, California Academy of Sciences, San Francisco, USA; ZIN, Zoological Institute of the Russian Academy of Sciences, Saint Petersburg, Russia.

SYSTEMATICS

Family Scarabaeidae Latreille, 1802

Subfamily Orphninae Erichson, 1847

Genus *Madecorphnus* Paulian, 1992

***Madecorphnus hanskii* sp. nov.**

(Figs 1–6)

Holotype. Male: MADAGASCAR, Ambohitantely [Reserve], 18°10'S 47°17'E, 24 March 2005, wet forest, I. Hanski group leg. (ZIN).

Etymology. The new species is named after Prof. Ilkka Hanski (Helsinki), who collected the type specimen.

Differential diagnosis. *M. hanskii* sp. n is similar to *M. falciger* (Lansberge, 1886) and *M. punctatus* Frolov, 2010, in having internal sac of aedeagus armed with 3 sclerites: 1 relatively long, spur-like,

and 2 comma-shaped or somewhat bifurcated (Figs 4, 5). It can be separated from these species by the shape and relative size of these sclerites and, from the latter, by the shape of parameres and sparse punctuation of head and pronotum (cf. Frolov 2010: figs 12, 16, 23, and 27).

Description. Holotype, male (Figs 1, 2, 4, 5). Body length 5.3 mm. Color uniformly brown.

Right mandible as long as left, without tooth behind apex. Labrum trapezoidal, with broadly rounded sides, length about 1/6 width (in dorsal view). Clypeus very slightly asymmetrical, apically obtuse, with 2 long and 6 shorter setae on the apical margin. Genae very small, not protruding beyond eyes. Canthus and frontal suture absent. Clypeus almost flat, minutely depressed apicomediaally. Head without traces of frontoclypeal suture, finely punctate with minute punctures separated by greater than 5 times their diameter.

Pronotum approximately 1.6 times wider than long, widest medially. Disc of pronotum convex, without any depressions, tubercles, or ridges. Punctuation on pronotum similar to that on head. Margins with relatively wide border, lateral margins with 4 long setae: 1 seta on basal angle, 1 seta approximately in the middle of lateral margin, and 2 setae on the apical angle.

Scutellum triangular, right angled apically, about 1/13 length of elytra.

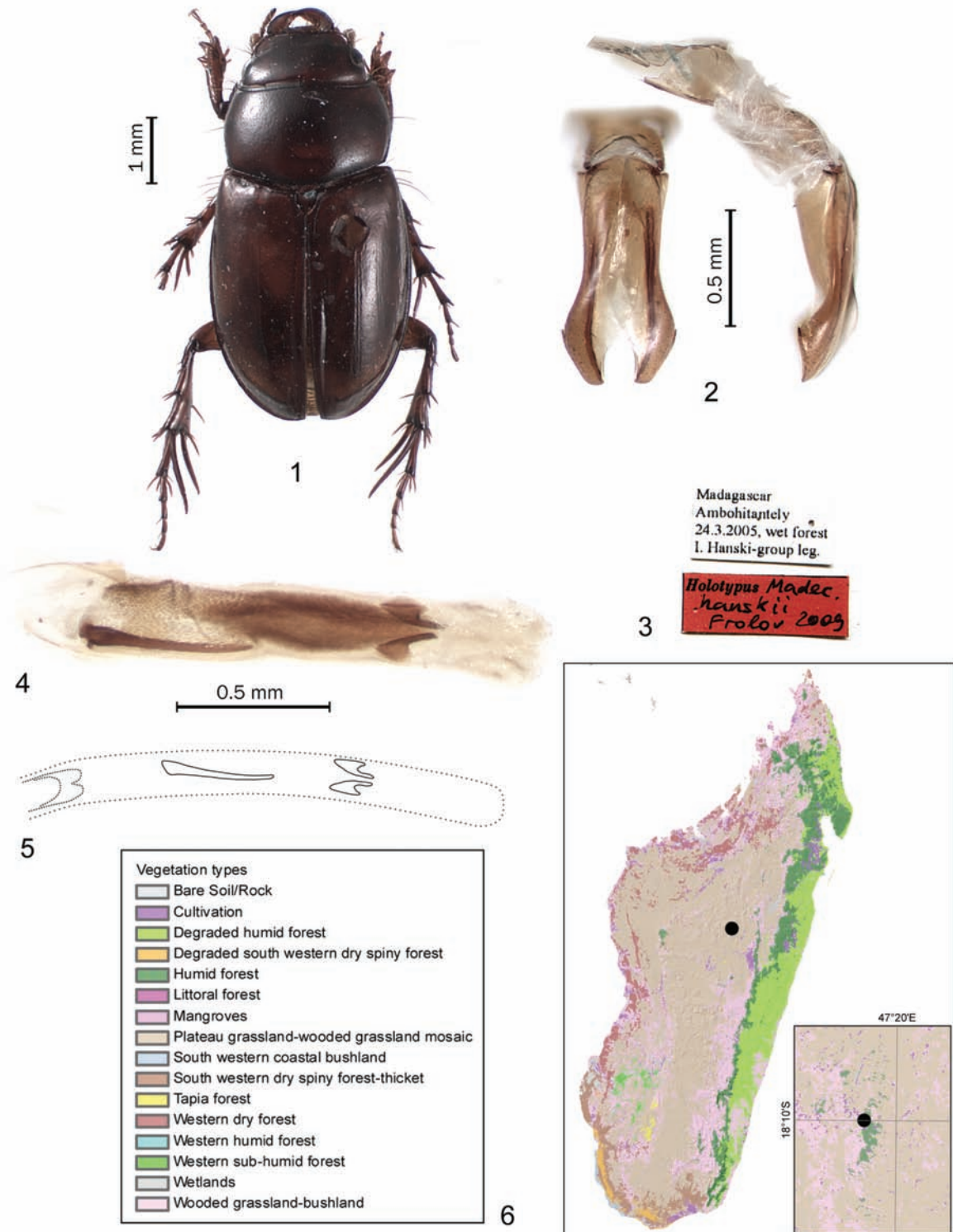
Elytra convex, with distinct humeral calli, widest at basal third, glabrous. First stria distinct and reaching the apex of elytron, other striae indistinct. Disc of elytra with a few relatively large punctures. Epipleura with long, sparse, brown setae. Base of elytron with border. Wings fully developed.

Protibiae with 3 outer teeth, lateral margin basad of outer teeth not crenulate. Protibial apex with robust, spur-like seta and 2 smaller setae basally. Middle and posterior legs similar in shape to each other, posterior legs somewhat longer. Longer tibial spur shorter than 2 basal tarsomeres in middle legs and longer than 2 basal tarsomeres in posterior legs.

Parameres with teeth laterally, narrowly rounded apically in dorsal view and curved downwards in lateral view (Fig. 2). Internal sac with a long spur-like sclerite and 2 smaller somewhat comma-shaped sclerites (Figs 4, 5).

Female unknown.

Distribution and habitat. The type specimen of *M. hanskii* sp. nov. was collected in wet forest in



Figs 1–6. *Madecorphmus hanskii* sp. nov., holotype, male: 1 – habitus; 2 – parameres in dorsal and lateral view; 3 – labels; 4 – invaginated internal sac of aedeagus; 5 – schematic representation of armature of invaginated internal sac; 6 – distribution map and a legend to vegetation types.

Ambohitately Reserve. The reserve is situated at altitudes of about 1500 m a. s. l. and houses last remnants of forest on the central plateau of Madagascar. *M. hanskii* sp. nov. is apparently a forest litter dweller and, due to severe deforestation of the central plateau, its current range may be limited to this small forest remnant (Fig. 6).

***Madecorphnus aquilonius* sp. nov.**

(Figs 7–12)

Holotype. Male: MADAGASCAR, Diego-Suarez Province, Sakalava Beach, dwarf littoral forest, elevation 10 m, 13–16 May 2001, 12°15′46″S, 49°23′51″E, R. Harin’Hala coll., malaise trap across sandy trail, MA-01-04B-09, CASENT 8014036 (CASSF).

Etymology. The epithet of the new species is a Latin word meaning “northern”.

Differential diagnosis. From other *Madecorphnus* species *M. aquilonius* sp. nov. can easily be separated by having characteristic internal sac armature consisting of 2 rather large sclerites: a spur-like one and an asymmetrical, claw-shaped one (Figs 10, 11).

Description. Holotype, male (Figs 7, 8, 10, 11). Body length 5.8 mm. Color uniformly brown.

Right mandible about 1/2 longer than left, without tooth behind apex. Labrum trapezoidal, with rounded sides, length about 1/6 width (in dorsal view). Clypeus distinctly asymmetrical, apically obtuse, with 4 relatively long setae on the apical margin. Genae very small, not protruding beyond eyes. Canthus and frontal suture indistinct. Clypeus slightly depressed apicomediaally. Head without traces of frontoclypeal suture, finely punctate with minute punctures separated by greater than 4 times their diameter.

Pronotum approximately 1.75 times wider than long, widest medially. Disc of pronotum convex, without any depressions, tubercles, or ridges. Punctuation on pronotum as fine as that on head. Margins with relatively wide border, lateral margins with 4 long setae: 1 seta on basal angle, 1 seta approximately in the middle of lateral margin, and 2 setae on the apical angle.

Scutellum triangular, angulate apically, about 1/11 length of elytra.

Elytra convex, with distinct humeral calli, widest at basal third. First stria distinct and reaching the apex of elytron, other striae indistinct. Disc of elytra sparsely punctate with relatively large punctures.

Epipleura with long, sparse, brown setae. Base of elytron with border connected to first elytral stria. Wings fully developed.

Protibiae with 3 outer teeth, lateral margin basad of outer teeth not crenulate. Apex with robust, spur-like seta and 2 smaller setae basally. Middle and posterior legs similar in shape to each other, posterior legs 1.4 times longer than middle. Longer tibial spur as long as 2 basal tarsomeres in middle legs and longer than 2 tarsomeres in posterior legs.

Parameres with small teeth laterally, narrowly rounded apically in dorsal view and curved downwards in lateral view (Fig. 8). Internal sac with 2 rather large sclerites: a spur-like one and an asymmetrical, claw-shaped one (Figs 10, 11).

Female unknown.

Distribution and habitat. This species is known from the only locality in northernmost Madagascar. This locality is some 40 km NE of the locality of *M. cuccodoroi* Frolov, 2010, but, more interestingly, the new species occurs in sandy littoral forest of the Madagascar dry deciduous forest eco-region while the latter species was found in humid forest of Amber Mountain (Frolov 2010b).

***Madecorphnus barclayi* sp. nov.**

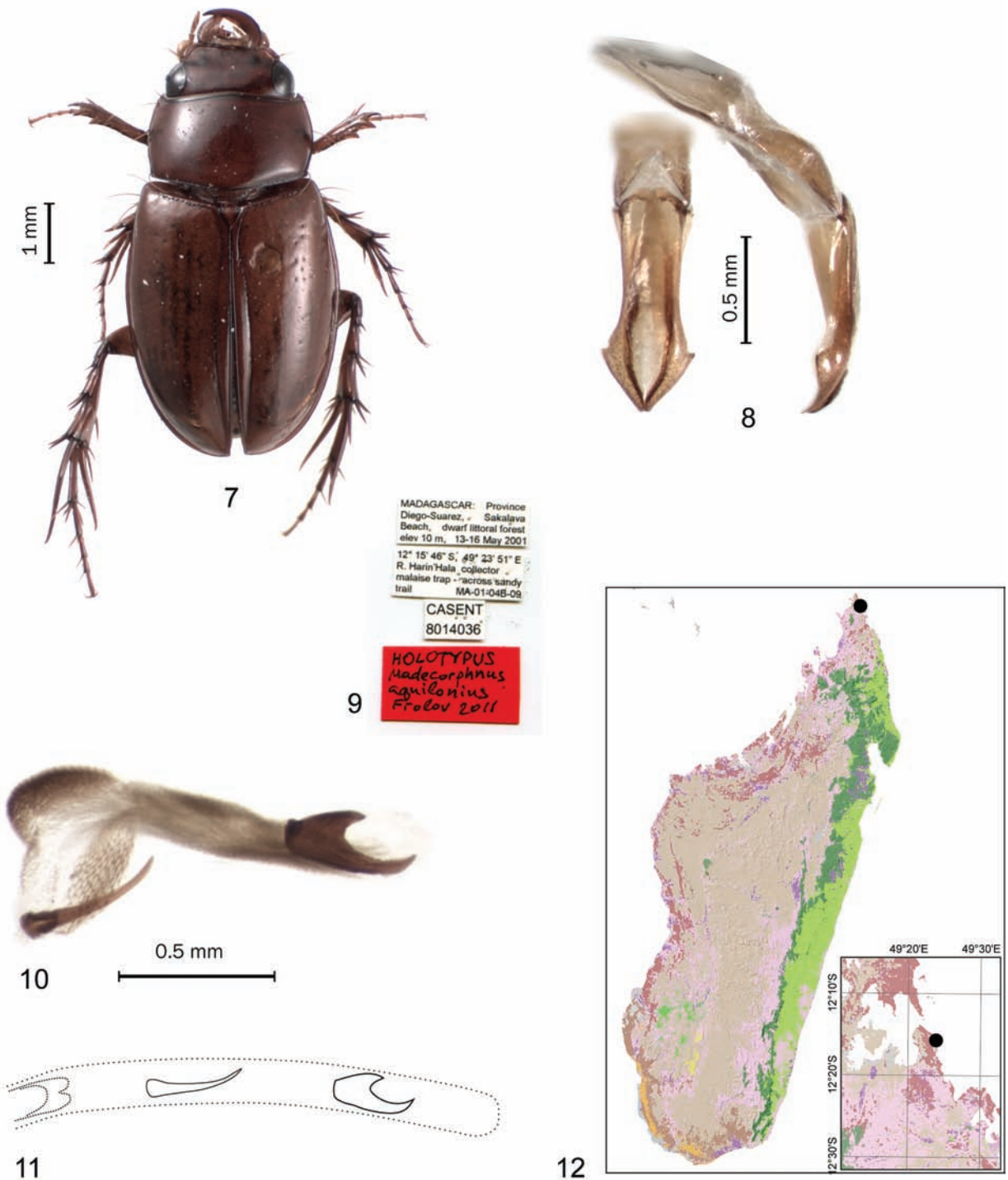
(Figs 13–19)

Holotype. Male: MADAGASCAR, E. Masoala, 50–470 m, R. Antsamanarana, 3–7 December 1993, Flight Intercept Trap, 1994–138 (BMNH).

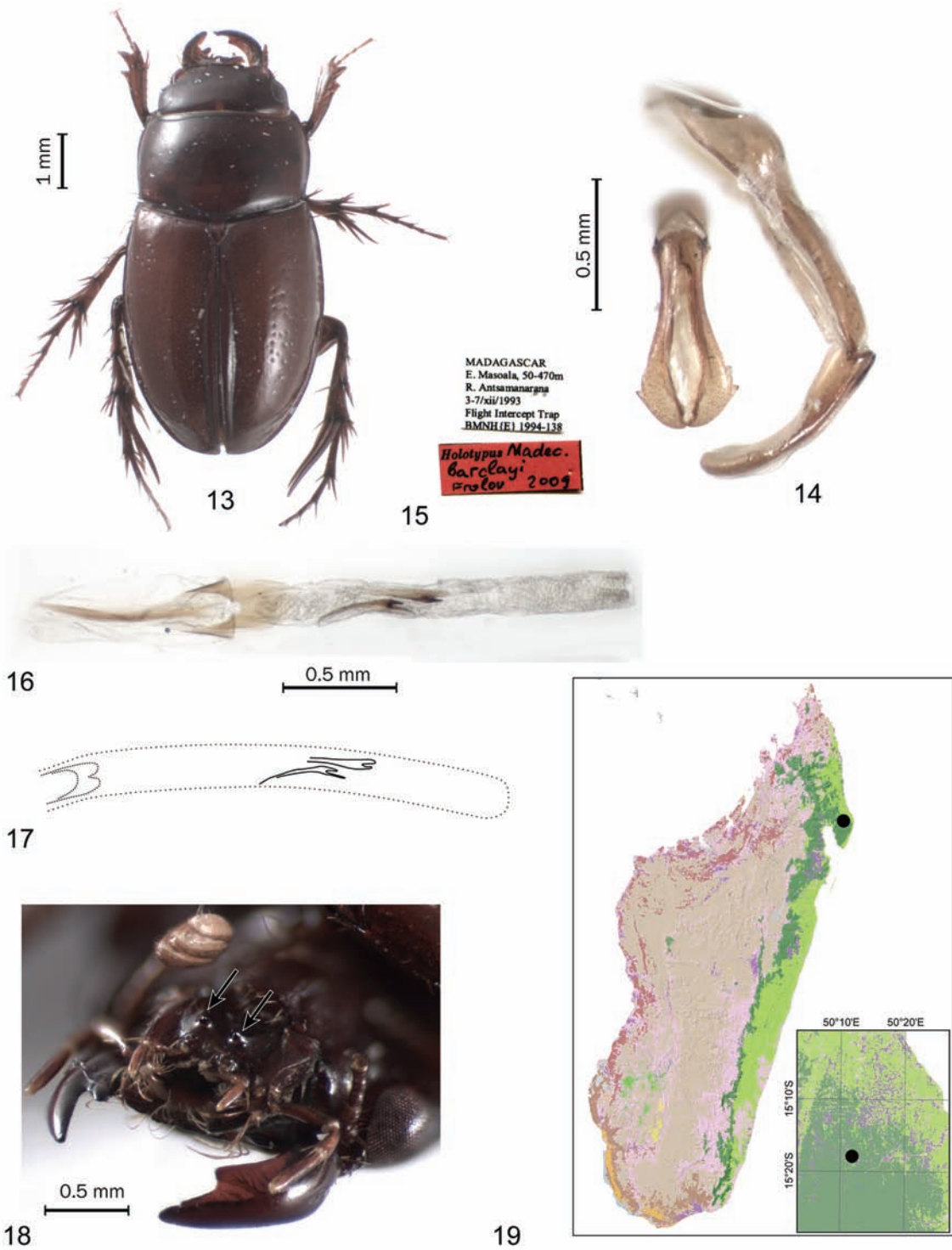
Paratypes. Two specimens with the same locality label as the holotype, male (ZIN) and female (BMNH).

Etymology. The new species is named after Maxwell Barclay, curator of Coleoptera collection of BMNH.

Differential diagnosis. This species is similar to *M. montreuili* Frolov, 2010, in having 2 distinct tubercles on the mentum (Fig. 18) and bidentate apex of right mandible (Fig. 13), but differs from it in having internal sac of aedeagus with two slender bifurcate sclerites (Figs 16, 17) as opposed to having 3 conical to spur-shaped sclerites in the latter species (cf. Frolov 2010a: Fig. 21). All the type specimens of *M. barclayi* sp. nov. are uniformly castaneous while all specimens of *M. montreuili* are colored dark brown to black. The body coloration however may not be as diagnostically reliable character as the internal sac armature.



Figs 7–12. *Madecorphnus aquilonius* sp. nov., holotype, male: 7 – habitus; 8 – parameres in dorsal and lateral view; 9 – labels; 10 – invaginated internal sac of aedeagus; 11 – schematic representation of armature of invaginated internal sac; 12 – distribution map (see Fig. 6 for legend).



Figs 13–19. *Madecorphnus barclayi* sp. nov., holotype, male: 13 – habitus; 14 – parameres in dorsal and lateral view; 15 – labels; 16 – invaginated internal sac of aedeagus; 17 – schematic representation of armature of invaginated internal sac; 18 – head in dorsal view (tubercles on mentum arrowed); 19 – distribution map (see Fig. 6 for legend).

Description. Holotype, male (Figs 13, 14, 16–18). Body length 6.0 mm. Color uniformly castaneous, elytra somewhat paler. Right mandible about 1.5 times longer than left, strongly curved, with a tooth behind apex (Fig. 13). Labrum trapezoidal, with rounded anterior angles, its length about 1/5 width (in dorsal view). Mentum with 2 conical tubercles (Fig. 18). Clypeus slightly asymmetrical, almost flat anteriorly, obtuse, with 1 long and a few smaller setae. Genae almost indistinct. Canthus and frontal suture absent. Head dorsally with minute punctures separated by more than 5 puncture diameters.

Pronotum 1.5 times wider than long, widest medially. Margins with relatively wide border, lateral margins with 4 long setae. Punctuation on pronotum similar to that on head.

Elytra convex, with distinct humeral calli. Maximum width approximately at basal 1/3. First stria distinct and reaching the apex of elytron, other striae indistinct. Epipleura with long, sparse, brown setae. Base of elytra with border connected to first elytral interval. Elytra punctate with sparse relatively large punctures on disc.

Anterior tibiae with 3 outer teeth, lateral margin basad of outer teeth not crenulate. Apex with robust, spur-like seta and a few smaller setae basally. Middle and posterior legs similar in shape, posterior legs 1.3 times longer than middle. Longer tibial spur shorter than two basal tarsomeres in middle legs and almost as long as 3 tarsomeres in posterior legs.

Aedeagus. Parameres symmetrical, relatively wide in dorsal view, with 2 distinct teeth laterally (Fig. 14). Internal sac with 2 slender bifurcated sclerites (Figs 16, 17).

Paratypes. Body length 5.6 mm (male) and 5.5 mm (female). Apart from body length the male paratype is very similar to the holotype. The female differs from the males in having short mandibles and long protibial spur. The female paratype is damaged and lacking the right elytron.

Distribution and habitat. *Madecorphnus barclayi* sp. nov. is known from one locality in the northern part of the Masoala Peninsula. It is the only species

of the genus recorded from the Peninsula so far. The Masoala Peninsula is one of the largest forest blocks in Madagascar and a top conservation priority due to its lowland humid forests, now rare elsewhere in Madagascar (Du Puy and Moat 1996; Kremen et al. 1999).

ACKNOWLEDGEMENTS

The author is thankful to I. Hanski for donating material to the ZIN collection, and Maxwell Barclay (BMNH) and Jere Schweikert (CASSF) for loans of the *Madecorphnus* specimens. Two anonymous reviewers are acknowledged for their comments on the manuscript. This work was supported by the Russian Foundation for Basic Research (grant 10-04-00539-a) and Ministry of Education and Science of Russian Federation (contract 16.518.11.7070).

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Submitted March 23, 2012; accepted May 25, 2012.